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Article

Self-reported pH1N1 infl uenza vaccination coverage for Ontario

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Abstract

Background

In the fall of 2009, Canada undertook a mass vaccination campaign against pH1N1. This report provides an overview of self-reported pH1N1 vaccination coverage of the Ontario population, building on an existing random digit-dialling telephone survey, in which 9,010 Ontario adults participated. Based on the results, 34.5% of Ontario residents were vaccinated: 33.3% of adults aged 18 or older and 38.6% of children and adolescents younger than age 18. Respondents reporting high-risk chronic conditions were significantly more likely to report being vaccinated than were people who did not report such conditions. Determining vaccination uptake for the Ontario population is important in the evaluation of the province's pH1N1 prevention program.

Keywords

immunization, influenza A virus H1N1 subtype, preventive health services, population-based health planning

Author

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The mass vaccination campaign against pH1N1 that Canada undertook in the fall of 2009 was the largest ever conducted in the country. The vaccine became available to Ontario residents October 26, and by December 6, the province had distributed enough doses to cover 81% of the population.[1] Because the vaccine was delivered through public health units, several methods were used to document coverage, making an overall Ontario estimate challenging to compute. This report, based on an existing random digit-dialling telephone survey, provides an overview of self-reported pH1N1 vaccination uptake for Ontario (see *The data*).

One in three

Based on the results of the Rapid Risk Factor Surveillance System (RRFSS) survey, pH1N1 vaccination coverage for Ontario from the end of October 2009 to the end of April 2010 was 34.5% overall: 33.3% for adults aged 18 or older, and 38.6% for children and adolescents younger than age 18 (Table 1). Sensitivity analyses that excluded respondents missing age information yielded almost the same percentages: 34.4% overall, 33.0% for adults, and 38.5% for children and adolescents.

These results are broadly in line with estimates in two earlier reports. The Chief Medical Officer of Health's report, released in June 2010, used data from a weekly Ipsos Reid poll conducted from October 2009 to mid-January 2010 to determine pH1N1 vaccination coverage. According to this poll, approximately 39% of Ontarians had been vaccinated,[2] somewhat above the estimate in the current analysis.

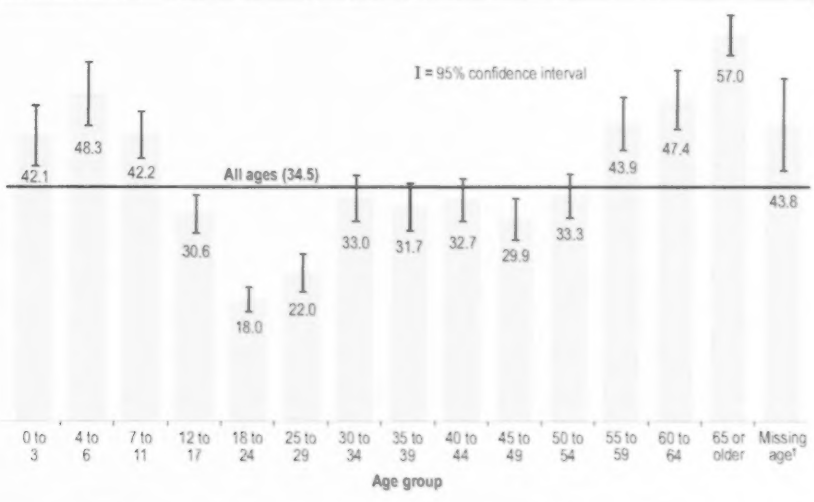
Based on data from the RRFSS survey, 33% of Ontario residents aged 12 or older received the pH1N1 vaccine. For the same age group and the same

Table 1
Percentage vaccinated against pH1N1, by selected characteristics, household population, Ontario, October 2009 through April 2010

Characteristic	Sample size	Weighted %	95% confidence interval from	to
Total	**11,720**	**34.5**	**33.7**	**35.4**
Age group				
0 to 17	2,791	38.6	36.8	40.4
18 or older	8,929	33.3	32.3	34.3
Sex				
Male	3,675	30.9	29.5	32.3
Female	5,254	35.7	34.3	37.1
High-risk chronic condition				
Yes	2,286	45.4	43.1	47.7
No	6,643	30.2	29.2	31.3
Adults with children in household				
Yes	2,853	35.2	34.0	36.4
No	6,063	33.8	32.5	35.0

Source: Ontario Rapid Risk Surveillance System, January through May 2010

Figure 1
Percentage vaccinated against pH1N1, by age group, household population, Ontario, October 2009 through April 2010



† 19 children, 208 adults
Source: Ontario Rapid Risk Surveillance System, January through May 2010

interview period (January through April 2010), the Canadian Community Health Survey reported 32.2%.[3]

The vaccination status of adults living in households with at least one child (35.2%) did not differ significantly from that of adults in households with no children (33.8%).

Youngest and oldest

The percentage of individuals vaccinated varied by age, with the highest levels at the extreme ends of the age range (Figure 1). Fully 57% of seniors aged 65 or older were vaccinated, as were more than 40% of adults aged 55 to 64 and children aged 0 to 11. By contrast, around 20% of adults aged 18 to 29 reported having been vaccinated.

Higher percentage of women

Overall, a significantly higher percentage of women than men aged 18 or older were vaccinated (35.7% versus 30.9%; $p<0.0001$), a pattern that prevailed in most age groups (Table 2). At ages 40 to 44, the difference (39.0% versus 26.0%) was statistically significant.

Chronic conditions

One in five (20.3%) adults aged 18 or older reported a chronic condition that, according to the National Advisory Committee on Immunizations,[4] put them at high risk of complications from pH1N1 infection. These people were significantly more likely than those without a high-risk chronic condition to have been vaccinated: 45.4% versus 30.2%. While women were generally more likely than men to have been vaccinated, for those with high-risk chronic conditions, the percentages were almost the same (Table 2).

November peak

The pH1N1 vaccine was available to Ontario residents from October 26, with nearly 23% of people who were vaccinated receiving their shot in the first week of the campaign. Almost 44% of vaccinated Ontarians received their vaccination in November (Figure 2).

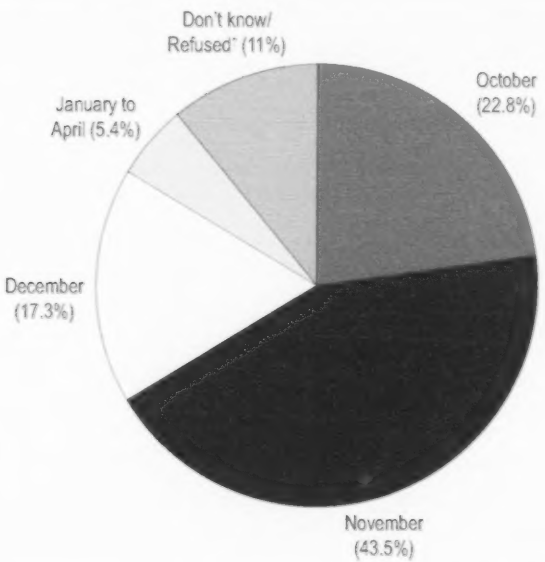
In December, a further 17.3% of vaccinated people received the pH1N1 vaccine. A number of factors may have contributed to the decline observed in December. For example, by the time priority was extended to include the general population (in December), many may have felt that obtaining the vaccination was not necessary. Results from a study in Australia showed that a high percentage of people were not vaccinated for this reason.[5] In the January to April 2010 period, 5.4% of

Table 2
Percentage vaccinated against pH1N1, by sex, age group and chronic condition, household population aged 18 or older, Ontario, October 2009 through April 2010

	Men			Women		
		95% confidence interval			95% confidence interval	
	%	from	to	%	from	to
Age group						
18 to 24	16.8	14.3	19.2	19.3	16.6	21.9
25 to 29	18.2	14.6	21.8	25.9	21.7	30.2
30 to 34	28.9	24.3	33.5	37.3	32.4	42.2
35 to 39	27.0	22.2	31.9	35.9	31.0	40.8
40 to 44	26.0	21.7	30.2	39.0	34.4	43.6
45 to 49	29.4	25.0	33.8	30.4	26.2	34.6
50 to 54	33.4	28.8	37.9	33.2	28.6	37.8
55 to 59	39.5	34.2	44.8	48.5	42.9	54.2
60 to 64	45.7	39.8	51.6	49.5	42.9	56.1
65 or older	59.2	55.0	63.5	54.9	50.8	59.1
Missing[1]	35.1	24.3	46.0	49.3	40.8	57.7
High-risk chronic condition						
Yes	45.5	42.1	48.8	45.3	42.2	48.5
No	27.4	25.9	28.8	33.1	31.6	34.7

[1] n=208
Source: Ontario Rapid Risk Surveillance System, January through May 2010

Figure 2
Percentage vaccinated against pH1N1, by month, household population, Ontario, October 2009 through April 2010



[1] n=426
Source: Ontario Rapid Risk Surveillance System, January through May 2010

those who received the pH1N1 vaccine had their shot.

Conclusion

Estimates of vaccination coverage are important in the evaluation of Ontario's pH1N1 prevention program. Identifying the extent of coverage offers important information on the potential burden of future waves of pH1N1. Individuals at highest risk of complications from pH1N1[6]—young children, the elderly and those with chronic conditions—had high rates of vaccination. This suggests that a large number of Ontario residents who were at highest risk were protected as a result of having been vaccinated. ■

Acknowledgements

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The data

Data were collected using Ontario's Rapid Risk Factor Surveillance System (RRFSS) infrastructure. RRFSS is an ongoing, random digit-dialing telephone survey of the adult population in private households in 18 of the province's 36 health regions. RRFSS gathers surveillance data, monitors public opinion on key public health issues, and collects information on emerging issues of importance to public health in Ontario. More information about RRFSS can be found at www.rrfss.ca.

The 18 health units that regularly participate in RRFSS each obtain information from approximately 400 households for every four-month data collection cycle; surveys are conducted by the Institute for Social Research at York University. For this study of pH1N1 vaccination uptake, Public Health Ontario funded an augmentation of the sample to include households in the 18 health units not usually involved in RRFSS.

A two-stage stratified cluster sampling design was used, with households as the first stage and household members as the second. In the first stage, telephone numbers of private households were chosen from telephone books and commercially available compiled lists.[7] The sample included numbers on either side of those that were selected, thereby ensuring that numbers that were not "listed" would be included. This made it possible to access cellphones as well as land lines. Residents of long-term care facilities, penitentiaries and other institutions were not included. In the second stage, an adult in the selected household was chosen. In households with more than one adult, the person whose birthday came next was selected. If children younger than 18 lived in the household, the adult respondent answered questions about the child with the next birthday. Interviews were conducted from January 14 through May 4, 2010.

Respondents were asked, "Since October 2009, have you received the H1N1 flu shot?" Those who reported having had a flu shot were asked, "In what month was that?" For children and adolescents younger than 18, the same questions were asked of the adults responding on their behalf. Respondents were asked if a doctor or other health care professional had ever told them they had any of the following disorders: high blood pressure, asthma, diabetes, or any other chronic disease including but not limited to heart disease, cancer or thyroid disorder. Those who reported having been diagnosed with asthma, diabetes, cancer, heart, lung or kidney disease or an immune or blood disorder were classified as having a *high-risk chronic disease*.[4]

A total of 9,010 adults participated in the survey (participation rate= 57.7%). Those whose vaccination month was incompatible with the month in which they were interviewed were dropped (n=36; 0.4%), as were those with a refused/don't know response (n=45; 0.5%) to the vaccination question. In total, 8,929 adults were retained for analysis.

As well, 2,867 adults who were interviewed lived in a household with at least one child. Of these, 11 (0.4%) reported a vaccination date for the child incompatible with their interview month, and 65 (2.3%) were not aware of or refused to provide information about the child's vaccination status. Consequently, 2,791 children and adolescents younger than age 18 were retained for analysis.

Results for people aged 18 or older were weighted to account for the number of adults in the household and the population in each health unit area, and were then post-stratified by the age and sex distribution of the 2009 Ontario population. Adult weights were normalized to maintain the effective sample size and incorporated into all analyses. Weights could not be calculated for respondents missing age information (n=208); they were assigned a weight of 1 and included in the final analysis. A sensitivity analysis removing individuals with missing age was also conducted. Results for children and adolescents younger than 18 were weighted to account for the number of children in the household. Those missing the number of children in the household (n=7) were assigned a weight of 1 and included in the final analysis. Sensitivity analyses were also conducted. Analyses were carried out using SAS Statistical Software (Version 9.2, Cary, NC) and PASW Statistics 18, Release 18.0.0 (SPSS Inc., Chicago, IL). All analyses were weighted, and two-sided 95% confidence intervals were calculated using normal approximation.

The relatively high participation rate and the small percentage excluded because of incomplete responses on the outcome variable tend to increase confidence in the results. Nonetheless, vaccine uptake may have been underestimated. Respondents might have been in the process of obtaining a pH1N1 vaccination while the interviews were being conducted. However, the majority of Ontario's mass vaccination clinics were closed in December.[8] While the possibility of recall bias exists, the novel nature of the immunization campaign and the media attention it received suggest that the risk of recall bias is minimal. Age was reported in years, so for children younger than 1 year of age, it is not clear if the child was more than 6 months old and unvaccinated, or under 6 months and not eligible. The small number (n=126) to whom this possibility applied minimizes this limitation. Because the survey was self-reported, the possibility of misclassification of vaccine status cannot be ruled out. Finally, by definition, a telephone survey excludes people without telephones, such as those who are homeless or live in remote areas. Statistics Canada estimates that 0.9% of Canadian households do not have telephone service.[9]

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